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Rates of Feed Consumption By Livestock

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Contents

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Foreword

THE necessity for re-planning the farm business frequently in recent years to introduce new production techniques and to adapt the plan to changing economic conditions and to avoid over or under stocking one's farm has created a need for data on the feed requirements of the different types of livestock.

Feed requirements are presented in generalized form for each type of livestock. The generalized feed requirements in most cases are derived from published results of feeding experiments and cost of production studies conducted by agricultural experiment stations and colleges.

These data should be supplemented by the farmer's feeding experience. No two feeders secure identical results with the same quantity of feed.

The material is not an appraisal of various rations and methods of feeding, or to advocate one system in preference to another. For this type of information, the reader is advised to consult the livestock specialist and the literature dealing with methods of feeding and management of livestock.

The author expresses his appreciation for the cooperation and assistance given him by members of the Ohio Agricultural Experiment Station, the College of Agriculture and Extension Service of The Ohio State University, and particularly for the valuable suggestions and criticisms given by the members of the Departments of Animal, Dairy, and Poultry Science. He also acknowledges the data obtained from results of many animal feeding experiments and cost of production studies conducted by numerous agricultural experiment stations and colleges throughout the country.

Using Feed Requirements Data

in Planning The Farm Organization

Limitations of Feed Requirement Data

Variation in Quality of Feed.—One limitation of feed requirement data is that the quality of feed grains, roughages and pastures varies from year to year. During the same year, there will be variations between farms and between areas. Livestock men know that in some years a bushel of corn will produce more gain than in others. Similarly a given quantity of leafy green hay will produce better results than hay that has been cut too late, rained on too much or foul with weeds. In wet seasons, both pasture and hay usually contain less feeding value per unit of weight than in dry seasons. Corn silage varies in feeding value as the quantity of grain and stover varies and with the stage of maturity when placed in the silo.

Variation in Quality of Livestock.—A second limitation of the data is the variation in the livestock being fed. Diseased and parasite ridden livestock will require more feed for a given production than healthy animals. Stunted animals, like diseased animals, are handicapped. Poorly bred animals frequently make slow and costly gains. In the case of the dairy cow or hen the production of milk and eggs is limited by the individual inherited capacity to produce.

Variation in the Human Factor.—A third limitation is the human factor. One man can take a given quantity of feed and livestock and, due to his skill, produce more than his neighbor. The much quoted statement, "The eye of the master fattens his cattle," is significant.

In light of these limitations, appraise your own ability as a feeder, your equipment, the quality and health of your livestock and the quality of your feed, then adjust accordingly.

Estimating Home-Produced Feeds Available

In planning the livestock and feed program for a farm, accuracy in determining the feed supply is as important as the feed requirement data used in calculating the number of livestock that can be carried. A significant over or under estimation of the supply, particularly an over estimation, often leads to serious trouble and financial loss.

Farmers who have operated the same farm or farms for a number of years generally know what their crop yields will average and what the carrying capacity of their pastures are. For the farmer who is operating a farm that is new to him, the crop yield history and the carrying capacity of the pasture may be obtained with a fair degree of accuracy by talking with former operators and neighboring farmers and by appraising productive capacity of the land.

Corn.—According to data obtained at the Illinois Agricultural Experiment Station, well matured comparatively dry corn when husked will shrink about 15 percent between November and the following summer. Corn that goes into the crib in the fall in a rather sappy condition will shrink 18 to 20 percent, in some cases more. A 60-bushel yield of average quality corn in November will shrink to approximately 51 bushels of dry corn.

All the data contained in this publication on the quantity of corn required by livestock is on a dry weight basis. A fairly reliable estimate may be made by calculating the cubic feet of corn stored and then allow 2.5 cubic feet for each bushel.

The 10-year average corn yield in Ohio for the period, 1940-49, was 49 bushels per acre.

Other Grains.—A fairly exact yield of oats, barley, rye, wheat and soybeans may be determined by calculating the cubic feet of the stored grain and dividing it by 1.25, the approximate cubic foot content of a bushel of small grain. It is not necessary to make any adjustment for shrinkage in small grains.

Hay—On farms where hay is baled, the most accurate method is to keep a record of the number of bales harvested and to convert it into tons by multiplying by an average bale weight after the hay has been in storage for several weeks. If the number harvested is not known, an estimate of the number can be made by determining the number of bales per layer and the number of layers of bales. A second method is to determine the cubic feet of hay and divide by 250 feet. This will give a fairly reliable estimate of tonnage for both baled and chopped hay.

Pasture.—D. R. Dodd has the following to say on determining the carrying capacity of pasture. Dodd calls the feed required by one cow in one day an "animal unit grazing day." An animal unit grazing day represents the amount of pasture required to provide 16 pounds of total digestible nutrients, or the amount that would be needed by a 1000 pound cow producing 20 pounds of milk in one day.

"In order to determine the feed produced by pasture first estimate the hay yield that might be expected if the crop were permitted to mature.

"For example, assume the crop is alfalfa-grass with a stand and growth that indicates a yield of 8000 pounds of hay. This is twice the yield indicated for this crop; so the grazing days of pasture would be double those indicated in Dodd's table for the season and for each month.

"Another way of determining the total animal unit grazing days from anticipated hay yield is to take 2 percent of this anticipated hay yield in pounds. This figure will approximate the total animal unit grazing days of pasture.

"Legumes produce more midsummer pasture than grass. However, bromegrass, orchardgrass and tall fescue do produce more than timothy in midsummer. Therefore, where these grasses are present in considerable amount, May and June figures may be lowered slightly and August and September figures raised proportionally. The total animal unit grazing days of pasture will still hold the same relationship to hay yield as indicated."

Silage—Horizontal silo capacity may be computed by multiplying the mean width in feet by the height in feet of settled silage by the length of the silo in feet adjusted for the slope at one or both ends. This adjustment may be made by reducing the length by twice the height where sloped at both ends as in most bunker type silos or by the height when one end is perpendicular and the other sloped as in the case of trenches. This will give the cubic content in feet. To calculate total tonnage, multiply the cubic content of silage by 30 pounds (the approximate density per cubic foot of settled silage in horizontal silos) and divide by 2000 pounds. To determine the amount of feedable silage, a further adjustment must be made for spoilage.

Spoilage losses depend on size of the silo, the area exposed, the care taken in packing, type of cover used, etc. These losses vary from as low as 5 percent to over 17, averaging about one ton in six unless unusual precautions are taken to reduce spoilage such as the use of plastic covers.

PASTURE PRODUCTION CALENDER - ESTIMATED ANIMAL UNIT GRAZING DAYS YIELD
WITH AVERAGE WEATHER CONDITION FOR DIFFERENT TYPES OF PASTURE (1)

Type of Pasture	Anticipated Hay Yield Lbs. (2)	A.U. Grazing Days for Year	Animal Unit Grazing Days per Acre per Month							
			April after Apr. 20	May	June	July	Aug.	Sept.	Oct.	Nov. till Nov. 10
Permanent Pasture (blue grass etc.)										
1. Untreated, Little grass no legumes, very poor	1000	20	-	6	7	2	1	2	2	-
2. Untreated, Some grass, No legumes, Poor	2000	40	-	12	13	4	2	5	4	-
3. Untreated, Few legumes, Fair	3000	60	-	17	19	7	3	7	7	-
4. Lime, Phosphate, White Clover, Good	4750	95	6	24	26	10	5	11	11	4
5. Lime Phosphate, Some manure, Legumes, very good	6500	130	9	33	33	14	7	14	14	6
Hay Type Rotation Pasture								See Footnote (3)		
1. Alfalfa-grass mixture full season yield level-St.Ave.	4000	80	2	22	27	12	12	5 (7)	(6)	(3)
2. Alfalfa-Grass mixtures after June hay yield level-St. Ave.	4000	40	-	-	-	17	17	6 (7)	(6)	(3)
3. Alfalfa-grass mixture full season yield level very Good	6500	130	3	36	44	19	19	9 (10)	(10)	(5)
4. Alfalfa-grass mixture after June hay yield level very good	6500	65	-	-	-	27	27	11 (10)	(10)	(5)
5. Red Clover Grass Mix Full Season Yield Level St.Ave.	3000	60	2	18	21	8	8	3 (3)	(5)	(2)
6. Red Clover Grass Mix after June Hay Yield Level St. Ave.	3000	20	-	-	-	8	8	4 (3)	(5)	(2)
7. Red Clover Grass Mix Fall Season yield level very Good	4500	90	3	27	31	12	12	5 (4)	(7)	(3)
8. Red Clover Grass Mix After June Hay Yield Level very Good	4500	30	-	-	-	12	12	6 (4)	(7)	(3)
Other Pasture Crops										
1. Ladino clover good	6000	120	6	30	30	16	8	18	12	-
2. Ladino Clover Excellent	8000	160	8	40	40	21	11	24	16	-
3. Timothy meadow. Full season. Yield Level St. Ave.	2000	40	-	10	12	5	2	5	4	2
4. Sudan Grass	4000	80	-	-	-	20	25	25	10	-
5. Sweet Clover Fall Grazed First, then Spring	4000	80	7	23	23	14	6	6	6	-
6. New Meadow Seedings Limited Season	1000	20	-	-	-	-	12	8	-	-

(1) An Animal unit grazing day represents the amount of pasture required to provide 16 pounds of total digestible nutrients, or the amount that would be needed by a 1000 pound cow in one day and produce 20 pounds of 4% milk.

(2) 2% of the estimated hay yield in pounds equals the approximate number of animal unit grazing days in the year. This takes into account the fact that under ordinary grazing methods approximately one-third less growth is harvested as pasture as is harvested as hay. Through more systematic rotational grazing a greater proportion can be harvested as pasture.

(3) Additional grazing days available on pastures that will be plowed the following spring since they can be pastured later in the fall.

Capacity of the Round Silo in Tons
(Table from Kansas Investigation)

Height in Feet	Inside Diameter in Feet: 8	9	10	11	12	13	14	15	16	17	18
	Capacity in Tons										
2	1.6	2.1	2.5	3.1	3.7	4.3	5.0	5.7	6.5	7.3	8.2
4	3.3	4.2	5.2	6.3	7.5	8.8	10.2	11.7	13.3	15.0	16.8
6	5.1	6.4	7.9	9.6	11.4	13.4	15.6	17.9	20.3	23.0	25.7
8	6.9	8.7	10.8	13.1	15.6	18.2	21.2	24.3	27.7	31.2	35.0
10	8.8	11.1	13.7	16.6	19.8	23.3	27.0	31.0	35.2	39.8	44.4
12	10.7	13.6	16.8	20.3	24.2	28.4	32.9	37.8	42.9	48.5	54.2
14	12.7	16.1	19.9	24.1	28.6	33.6	39.0	44.7	50.9	57.5	64.4
16	14.7	18.7	23.0	27.9	33.2	38.9	45.2	51.8	59.0	66.6	74.6
18	16.8	21.2	26.2	31.7	37.8	44.3	51.4	59.0	67.1	75.8	84.8
20	18.8	23.8	29.4	35.6	42.4	49.7	57.8	66.2	75.4	85.0	95.2
24	23.0	29.1	35.9	43.5	51.7	60.7	70.4	80.9	91.9	103.9	116.1
28	27.3	34.5	42.6	51.5	61.3	72.0	83.4	95.8	108.9	123.1	137.6
32	31.6	40.0	49.3	59.7	70.9	83.4	96.7	111.0	126.2	142.6	159.5
36	35.9	45.4	56.1	67.9	80.7	94.8	110.0	126.2	143.5	162.1	181.4
40	40.2	50.9	62.8	76.0	90.4	106.2	123.2	141.4	160.7	181.6	203.3

Upright Silos—The figures given above represent settled silage and do not refer to the height of the silo or the height of silage prior to settling.

Method for determining the amount of silage on hand at any time: (a) If the amount fed is known, subtract the tonnage fed from the total tons of settled silage on hand before feeding was begun; (b) if the tonnage fed is not known it can be estimated by determining how many feet of settled silage have been fed (assuming this to be 10 feet out of a silo 12 feet in diameter) and then ascertaining from the table the tonnage contained in a silo 10 feet high and 12 feet in diameter. According to the table, this amounts to 19.8 tons. If the silo originally contained 28 feet of silage after settling, or 61.3 tons, there would remain in the silo 41.5 tons after feeding the first 10 feet of settled silage. If 4 more feet are fed and it is desirable to know the quantity of silage remaining, ascertain from the table the tonnage contained in a silo 14 feet high and 12 feet in diameter and deduct this from the original amount.

Table 1. Number of Animals of Various Kinds that Will Consume Approximately As Much Pasture As One Cow In One Day

Kinds of Livestock	No. of Animals	Kinds of Livestock	No. of Animals
Dairy cows	1	Ewes with lambs to weaning	5
Dairy heifers	2	Lambs after weaning	12
Beef cows	1	Sows at 400 lbs.	5
Beef steers and heifers	2	Hogs at 150 lbs.	16
Horses and mules	1	Pigs at 50 lbs.	40

How Much Livestock to Carry—How Much Feed Required?

There are four levels at which a farm may be stocked. The level that will give the maximum net return will depend upon: (1) ability of manager, (2) facilities available and capital to work with, (3) the market outlets, (4) the skill and amount of labor on the farm, (5) the supply of feed and (6) the demand for livestock and livestock products.

The four levels are:

First—Livestock to provide for family needs only.

Second — Livestock for family needs plus enough more to consume the low value and waste products (pastures and roughages) but little or no saleable feed.

Third—Livestock to consume all feed produced on the farm.

Fourth—Livestock in excess of the feed producing ability of the farm.

Most farmers will have the necessary resources and the managerial ability to successfully stock their farm with enough livestock to utilize most of the unsaleable or low value pastures and roughages produced on the farm. (Second Level.)

Good managerial ability, competent available labor, suitable facilities, a good market and high producing livestock are essential to assure profitable operations when enough livestock is carried to use all of the feed produced. (Third Level.)

To successfully stock a farm above its feed producing capacity and to make up the differences by purchasing additional feed, grains, etc. (Fourth Level), requires high quality management, good well established markets, excellent livestock and dependable sources for additional feed.

Generally it is not considered a safe practice to stock a farm to the limit of homegrown feed unless past experience indicates that purchased feed grains and roughages can be profitably converted into livestock and products. Particularly is this true in the case of roughages and pasture.

When a scarcity in roughages and pasture arises it is usually the result of unfavorable weather which is not restricted to an individual farm but may affect large areas. Additional feed is either not available locally, or if available, only at high prices.

Experienced operators plan to keep slightly less livestock than their normal feed supply, particularly their roughage and pasture, will carry. Thus, they have some leeway in feeding and may carry livestock longer, feed to heavier weights, sell surplus feed or hold until another season.

When stocking at the Fourth Level the operators should know in advance the total amount of feed that will be needed so that arrangements can be made for the purchase of additional feeds.

Part I—The Dairy Enterprise

Experienced dairymen provide their cows with all the roughage and pasture they will consume regardless of milk production. The quantity of roughage and pasture that will be consumed depends to a large extent on the size of the cow and the quality and palatability of the roughage and pasture offered.

Concentrates, on the other hand, are fed somewhat in proportion to the quantity and butterfat content of milk produced.

The content of the concentrate ration is adjusted to the quality of hay and pasture provided. When these are low in palatability and protein content a concentrate ration containing more protein is required if production is to be maintained. The roughage requirements are set up for cows of different sizes and for various combinations of roughages. Generalized requirements are also included for a system of heavy-hay, light-grain feeding with abundant high quality hay and pasture.

Contents

A. Generalized feed requirements

The Dairy Cow:

System I—Concentrates fed in approximate ratio of 1 to 3 or 1 to 4 pounds of milk (the ratio depending on the fat content of the milk) with cows full fed roughage (with or without silage) and provided with abundant pasture throughout the season.

a. The approximate amount of concentrate required annually per cow is:

(1) When good alfalfa or very good mixed alfalfa clover hay is fed.

Annual milk production per cow	Grain and Supplement				
	Corn and cob meal	Ground Oats[1]	Wheat Bran	Soybean oilmeal or equivalent	Total*
	bu.	bu.	cwt.	cwt.	lbs.
Under 5,500 lbs. of 4.5% or under 7,000 lbs. of 3.5%....	15	14	2.0	1.8	1848
5,500 to 7,000 lbs. of 4.5% or 7,000 to 9,000 lbs. of 3.5%...	20	18	2.5	2.5	2436
7,000 to 8,500 lbs. of 4.5% or 9,000 to 11,000 lbs. of 3.5%..	24	22	3.5	3.0	2986
8,500 and up of 4.5% or 11,000 lbs. and up of 3.5%...	29	26	4.0	3.5	3554

* Total protein content approximately 13%.

(2) When average mixed alfalfa, clover, timothy, or very good clover timothy hay is fed.

Annual milk production per cow	Grain and Supplement				
	Corn and cob meal	Ground Oats[1]	Wheat Bran	Soybean oilmeal or equivalent	Total*
	bu.	bu.	cwt.	cwt.	lbs.
Under 5,500 lbs. of 4.5% or under 7,000 lbs. of 3.5%.....	13	13	2.0	3.5	1850
5,500 to 7,000 lbs. of 4.5% or 7,000 to 9,000 lbs. of 3.5%...	18	16	2.5	4.5	2436
7,000 to 8,500 lbs. of 4.5% or 9,000 to 11,000 lbs. of 3.5%..	22	20	3.0	5.5	2986
8,500 and up of 4.5% or 11,000 lbs. and up of 3.5%...	26	25	3.5	6.5	3568

* Total protein content approximately 16%.

(3) When good timothy with light mixture of legumes or fair mixed clover and timothy hay is fed.

Annual milk production per cow	Grain and Supplement				
	Corn and cob meal	Ground Oats[1]	Wheat Bran	Soybean oilmeal or equivalent	Total*
	bu.	bu.	cwt.	cwt.	lbs.
Under 5,500 lbs. of 4.5% or under 7,000 lbs. of 3.5%....	11	13	2.0	5.0	1864
5,500 to 7,000 lbs. of 4.5% or 7,000 to 9,000 lbs. of 3.5%...	15	18	2.5	6.0	2446
7,000 to 8,500 lbs. of 4.5% or 9,000 to 11,000 lbs. of 3.5%..	18	22	3.0	7.5	2978

* Total protein content approximately 18.5%.
[1] On farms where oats are limited or not available, they may be replaced by wheat bran, and corn-and cob meal in the ratio of 1 pound of each for each 2 pounds of oats.

b. The approximate amount of roughage required per cow in System I for cows of different weight during a 180-200-day winter feeding period.[1]

Weight of cow	Fed hay only	Fed both hay and silage (All hay she will clean up. Silage fed moderately.)		Fed both hay and silage (Hay fed moderately. All silage she will clean up.)	
		Hay	Silage	Hay	Silage
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
800	3600	2700	2700	2000	4800
1000	4500	3400	3500	2500	6000
1200	5400	4000	4200	3000	7200
1400	6300	4700	4800	3500	8400

[1] The actual quantity consumed will increase as the quality of the roughage increases. The above quantities are based on average to good quality hay.

c. Approximate Pasture Requirements in System I per Dairy Cow When No Supplementary Roughage Is Provided.

Size of cow	A. U. Days Consumed per Cow					
	Northern Ohio[1]		Central Ohio[1]		Southern Ohio[1]	
	Full Season	August	Full Season	August	Full Season	August
Small Cow	155	27	165	27	175	27
Average Cow .	175	30	185	30	195	30
Large Cow	195	33	205	33	215	33

[1] Pasture season in calendar days—Northern Ohio 165 180
Central Ohio 175-190
Southern Ohio 185-200

System II—When light concentrate feeding and a liberal use of meadow crops is used.[2]

The success of this system hinges on the liberal use of high quality legume hay during the winter with silage fed sparingly, access to all the high quality pasture the cow will consume during the entire season and the feeding of the concentrate ration during the part of the lactation period when milk production is in excess of 20 pounds per day. Liberal use of hay means feeding somewhat more than the cow will clean up.

a. The approximate amount of concentrate ration required annually in System II per cow for different levels of production.

Annual milk production per cow	Grain and Supplement				
	Corn and cob meal	Ground Oats	Wheat Bran	Soybean oilmeal or equivalent	Total*
	bu.	bu.	cwt.	cwt.	lbs.
5,500 to 7,000 lbs. of 4.5% or 7,000 to 9,000 lbs. of 3.5%..	8	15	1.5	1.3	1304
7,000 to 8,500 lbs. of 4.5% or 9,000 to 11,000 lbs. of 3.5%..	11	18	2.1	1.7	1704
8,500 lbs. and up of 4.5% or 11,000 lbs. and up of 3.5%...	13	23	2.7	2.1	2100

* Total protein content approximately 14.5%.
[2] In System II the quantities of feed suggested are based on the amount consumed in the dairy feeding trials at the Trumbull County Agricultural Experiment Station Farm. For detailed information see "Dairy Farming Based on Liberal Use of Meadow Crops," by M A Bachtell, C. J. Willard, C. F. Monroe, and W. Livezey, Ohio Agr. Exp Sta. Bul. 662, 1946.

b. The approximate amount of roughage required in System II per cow of different weights during a 180- to 200-day winter feeding period when fed both hay and silage.

Weight of cow	High quality legume hay fed liberally	Silage fed sparingly
lbs.	lbs.	lbs.
800	3600	2600
1000	4500	3200
1200	5400	3800
1400	6300	4500

c. The approximate pasture requirement in System II per cow are the same as in System I.

Dairy Herd Bull

The approximate quantity of feed required annually per bull separately confined—

Type of Feed	Pounds per head
Concentrate ration (content same as fed cows is generally satisfactory)	850
Hay and other dry roughage	6000
Silage	6000

The approximate quantity of feed required annually per bull kept with the herd—

Type of Feed	Pounds per head
Concentrate ration (content same as fed cow is generally satisfactory)	600
Hay and other dry roughage Silage Pasture	Same as average cow in herd

Dairy replacements

Birth to 1 year—(In addition to milk and calf starter)

Concentrates (same as fed cows)	500 lbs.
Hay (high quality)	1800 lbs.
Silage	1000 lbs.
Pasture A.U. days	10

One year to freshening

Concentrates (same as fed cows)	500 lbs.
Hay (average to good quality)	3000 lbs.
Silage	2500 lbs.
Pasture A.U. days	110

Part II—The Swine Enterprise

There are two parts to the typical hog enterprise, the breeding herd and the fattening herd. Most farms in Ohio with hog enterprises have both. The two-litter system is almost universal and full feeding from weaning to market is widespread.

Corn is the basic feed for both the breeding and fattening herds. Some oats are fed on many farms particularly to the breeding herd and, in years when corn and wheat prices are approximately the same, considerable quantities of wheat are fed to both.

The quantity of feed required to produce a market hog varies greatly between farms and also from year to year. Many factors cause these variations but prominent among them are quality of breeding animals, care at farrowing time, sanitation, the weight at which marketed, the type of ration fed, and the use made of pasture. The generalized requirements that follow are designed for the type and level of management currently prevailing on central and western Ohio farms where hogs are an important enterprise.

Contents

A. Generalized feed requirements

Brood Sows:

Managed under the two-litter system with access to all legume hay and pasture they will consume in season (average weight of breeding animal, 400 pounds.)

Approximate annual feed requirements per sow per year including pigs to weaning time.

a. When corn is only grain used

Corn (1960 lbs. shelled)	35 bus.
Protein supplement	230 lbs.
Legume hay in season	150 lbs.

Pasture in season—good legume pasture for the entire season equivalent to 35 A.U. days.

b. The 35 bushels of corn may be replaced with 23 bushels of corn and 21 bushels of oats.

c. The 35 bushels of corn may be replaced with an equal weight (1960 lbs.) of wheat or barley.

Herd Boar:

Approximate annual feed requirements

Corn	30 bus.
Protein supplement	150 lbs.
Legume hay in season	150 lbs.

Pasture in season—good legume pasture for entire season equivalent to 35 A.U. days.

Market Hogs:

a. Spring litter: Full fed with access to reasonably clean legume pasture during the entire feeding period. Approximate feed required to carry from weaning pigs (average weight 25 to 35 pounds) to market hogs (average weight 210 to 220 pounds) or an average gain per head of 185 pounds.

1. When corn is the only grain used

Protein supplement	70 lbs.
Corn (672 lbs. of shelled corn)	12 bus.
Pasture for 4 months equal to 6 A.U. days of pasture per pig.	
Approximate feeding period	130 to 145 days

2. When other feeds are used to replace all or part of the corn[1]

(a) When wheat makes up all or part of the grain requirement—Wheat will replace corn approximately pound for pound. Other requirements approximately the same as above.

(b) When barley or rye makes up all or part of the grain requirements—Barley or rye will replace corn at the approximate ratio of 1.1 pounds for each pound of corn. Other requirements approximately the same as above.

(c) When oats are used to make up not more than one-fourth of the grain requirement—Oats will replace corn at the rate of approximately 1.2 pounds for each pound of corn. Other requirements approximately the same as above.

(d) When hominy feed makes up all or part of the grain requirement — Hominy will replace corn approximately pound for pound. Other requirements approximately the the same as above.

b. Fall litter: Full fed with access to reasonably clean legume pasture until weather makes pasturing impractical. Approximate feed required to carry from weaning pigs (average weight 25 to 35 pounds) to market hogs (average weight 210 to 220) or average gain per head of 185 pounds.

1. When corn is the only grain used

Corn (728 lbs. of shelled corn)	13 bus.
Protein supplement	80 lbs.
Pasture from weaning until winter equal to 1 A.U. day of pasture per pig.	
Approximate feeding period	140 to 160 days

2. When other feeds are used to replace all or part of the corn, see data (a), (b), (c), and (d) under spring litter. Protein supplement and pasture requirements are approximately the same as listed in (1) immediately above.

[1] "Substitutes for corn for growing and fattening pigs," W. L. Robison, Ohio Agricultural Experiment Station Bulletin 607. The type of grain used will have some effect on both the quantity of supplement required and the rate of gain. However, in planning feed requirements this may be largely overlooked.

c. Feeding to weight above 210 to 220 pounds—To add 25 pounds additional weight per head, or carry to a market weight of 240 to 250 pounds will require approximately:

For the spring litter on pasture—

Corn	2.0 bus.
Protein supplement	10 lbs.

For the fall litter in dry lot—

Corn	2.1 bus.
Protein supplement	12 lbs.

d. Corn requirements at different weights, ration reasonably well balanced with protein supplement.[1]

Fed on pasture—

Weaning to 99 lbs.	3.7 bus.
100-149 lbs.	3.0 lbs.
150-199 lbs.	3.4 bus.
200-225 lbs.	1.9 bus.
Total	12.0 bus.

Fed in dry lot—

Weaning to 99 lbs.	4.0 bus.
100-149 lbs.	3.3 bus.
150-199 lbs.	3.7 bus.
200-225 lbs.	2.0 bus.
Total	13.0 bus.

Combined Requirements for a Sow and Her Spring and Fall Litters Carried to Market Weight:

Approximate amount of feed required for a sow plus feed to carry the spring and fall litters from weaning to a market weight of 210 to 220 pounds (computed on basis of 15 pigs saved to market weight per year per sow bred to farrow two litters per year).

1. When corn is the only grain used—

Corn	225 bus.
Protein supplement	1350 lbs.
Legume hay	150 lbs.

Pasture—0.75 acre of good legume pasture for entire season (7 to 8 months) equal to 90 A.U. days of pasture.

[1]Data derived from material provided by W. L. Robison, Dept. of Animal Science, Ohio Agricultural Experiment Station, Wooster, Ohio.

B. Feed requirements and rate of gain with different levels of protein and with and without an antibiotic supplement for pigs in dry lot[1]

	Without an antibiotic		With an antibiotic	
Level of protein:	Low	Standard	Low	Standard
Percent of protein:				
To 120 pounds	12.0	15.5	12.0	15.4
From 120 pounds	10.6	13.9	10.5	13.8
Average days old at start	66	67	68	68
Initial weight per pig, lb.	41.5	41.6	41.8	41.6
Final weight per pig, lb.	225.7	219.3	222.9	222.7
Average daily gain, lb.	1.64	1.69	1.72	1.72
Days to gain 180 pounds	110	107	105	105
Feed per 100 lb. gain, lb:				
Ground shelled corn	308.19	268.84	300.91	263.21
Soybean oilmeal	32.15	63.71	31.32	61.37
Ground alfalfa	18.49	17.97	18.07	17.56
B vitamin concentrate	0.37	0.36	0.36	0.35
B_{12} supplement	0.18	0.18	0.18	0.18
Antibiotic supplement			0.45	0.44
Minerals	10.32	8.37	10.06	8.15
Total	369.70	359.43	361.35	351.26

[1]Based on results of recent experiments using healthy pigs, conducted by W. L. Robison, Ohio Agricultural Experiment Station.

Part III—The Poultry Enterprise

Contents

A. Generalized feed requirements

I. The Laying Flock

(1) Light-breed commercial flock (average annual production per bird 175-190 eggs). Some large commercial flocks are now producing at rates approaching 200 eggs per bird. In such flocks, slightly more feed is consumed per bird than indicated below. The approximate annual grain and supplement requirement when computed on the basis of the number of birds housed each fall is 80 pounds per bird housed. This is the equivalent of 100 pounds per average layer in flock during year.

(a) On farms where home-grown grains are plentiful and can be used to provide part of the ingredients of the mash as well as the scratch grain, the approximate quantity of the the different feeds required per bird housed in the fall is:

Corn	35 lbs.
Wheat	20 lbs.
Oats	10 lbs.
Hi-protein supplement (38% protein)	15 lbs.
Total	80 lbs.

(b) On farms where home-grown grains are limited and part must be purchased in the form of laying mash the approximate quantity of the different feeds required per bird housed in the fall is:

Corn	20 lbs.
Wheat	10 lbs.
Oats	5 lbs.
Laying mash (20% protein)	45 lbs.
Total	80 lbs.

(2) Heavy-breed commercial flocks (average annual production per bird 160-180 eggs). Some large commercial flocks are now producing at rates approaching 190 eggs per bird. In such flocks, slightly more feed is consumed per bird than indicated below. The approximate annual grain and supplement requirement when computed on the basis of the number of birds housed each fall is 95 pounds per bird housed. This is the equivalent of 120 pounds per average layer in flock during year.

(a) On farms where home-grown grains are plentiful and can be used to provide part of the ingredients of the mash as well as scratch grain the quantity of the different feeds required per bird housed in the fall is:

Corn	40 lbs.
Wheat	18 lbs.
Oats	15 lbs.
Hi-protein supplement (38% protein)	22 lbs.
Total	95 lbs.

(b) On farms where home-grown grains are limited and part must be purchased in the form of laying mash, the quantity of the different feeds required per bird housed in fall is:

Corn	25 lbs.
Wheat	15 lbs.
Oats	10 lbs.
Laying mash (20% protein)	45 lbs.
Total	95 lbs.

II. Replacement Flock[1]

(1) Light-breed replacements—The approximate amount of grain and supplement required to grow a replacement pullet to maturity when on average range. (This includes what each pullet

(1) Under average management—When straight run chicks are purchased approximately 250 will need to be started in order to end the season with 100 pullets suitable for replacements. When sexed pullet chicks are purchased approximately 125 will need to be purchased to end the season with 100 pullets suitable for replacement.

consumed plus her share of the feed consumed by the cockerels up to 12-14 weeks, cull pullets and those that died.
When light-breed straight run chicks are used.

(a) When light-breed straight run chicks are used.

Corn	4 lbs.
Wheat	1 lb.
Oats	1 lb.
Starting and growing mash (20% protein)	25 lbs.*
Total	31 lbs.

(b) When light-breed sexed chicks are used.

Corn	3 lbs.
Wheat	1 lb.
Oats	1 lb.
Starting and growing mash (20% protein)	19 lbs.*
Total	24 lbs.

(2) Heavy breed replacement—The same conditions apply as given under light breeds.

(a) When heavy-breed straight run chicks are used.

Corn	5 lbs.
Wheat	1 lb.
Oats	1 lb.
Starting and growing mash (20% protein)	32 lbs.*
Total	39 lbs.

(b) When heavy-breed sexed pullet chicks are used.

Corn	3 lbs.
Wheat	1 lb.
Oats	1 lb.
Starting and growing mash (20% protein)	25 lbs.*
Total	30 lbs.

III. Small non-commercial flock. (100 or less birds housed in the fall.)
Approximate total annual feed required for both laying and replacement, per bird housed in the fall. (Requirements are based on brooding of straight run chicks and access to kitchen waste and liberal range.)

Per bird housed:

Corn	40 lbs.
Wheat	15 lbs.
Oats	15 lbs.
Purchased supplement and mash (20% protein)	50 lbs.
Total	120 lbs.

* Starting and growing mash fed alone during first 6 or 8 weeks then both grain and mash are fed.

IV. The broiler enterprise

Approximate feed required per broiler produced is from 9 to 11 pounds, depending on the breed used and weight at which sold.

V. The turkey enterprise

Approximate feed requirement per bird when kept off the ground the first 8 weeks and provided with a good legume pasture during remainder of the season (approximately 20 weeks) and when average market weight of birds is approximately 17 pounds.

28% starting mash	8 lbs.
20% range growing mash	38 lbs.
Assorted farm grains	26 lbs.

Pasture—One acre of good legume pasture for 100 to 120 birds.

Part IV—The Beef Enterprise

Contents

There are three general aspects or phases of the beef enterprise, namely, breeding, growing, and fattening, all of which are practiced on Ohio farms. Some farmers engage in all three, some engage in only one phase while still others combine two of the phases such as breeding and growing or growing and fattening. In addition, each phase may be handled differently on different farms. Some farmers keep what are commonly referred to as commercial breeding herds for the purpose of producing feeders. These they may sell as feeders but more often they are kept to feed out as baby beeves or rough through the first winter and feed out in late summer or early fall after a season on pasture. Others keep purebred breeding herds for the production of animals for breeding purposes. In the case of the growing and fattening phases, animals of different ages, grades, and sex may be grown or fed and to varying weights and degrees of finish.

A. Generalized feed requirements

I. The Breeding Herd

a. The beef cow in commercial beef breeding herd kept for the production of calves:

Approximate annual feed requirements per cow including calf to weaning[1]

Geographic area	Concentrate pounds[2]	Roughage	Pasture[3] A.U. days
Typical southeastern Ohio	280	2¼ tons average quality mixed hay	200–225
Typical western Ohio			
(1) No silage	250	2 tons average quality mixed hay	200–240
(2) Silage	50	1 ton average quality mixed hay and 2½ tons of silage[4]	

[1] Based on beef production cost studies conducted in southeastern Ohio in 1955 and in western Ohio in 1958.
[2] Both grains and supplements. It includes any feed fed in creep to calves as well as to mature animals.
[3] In western Ohio, this includes the equivalent of approximately 30 A.U. grazing days on corn stalk fields.
[4] Either grass or corn silage or both.

b. The beef cow in purebred beef breeding herd kept primarily for the production of animals for sale for breeding purposes—

Approximate annual feed requirements:

Somewhat more grain and supplement is generally fed in order to maintain the herd in better condition for show purposes. The level of condition at which the owner desires to keep the animals will determine the amount needed.

c. The cow in dual purpose herds or those kept for the production of both milk and calves—

Approximate annual feed requirements:

Cows milked—Feed requirements approximately the same as that for dairy cows with similar size and milk production. See the dairy enterprise for requirements.

Cows nursing two calves—Same as cows milked with similar level of milk production. See dairy enterprise for requirements.

d. The beef bull

1. When allowed to remain with the cow herd most of the year—annual feed requirement is approximately the same as that of cows in the commercial breeding herd.

II. The Growing and Replacement Herd

a. Beef calves—growth rather than finishing being the objective (initial weight 375 to 450 pounds).

1. Winter season

Approximate feed requirement and rate of gain during a normal Ohio winter feeding period

Types of ration used	Grain	Protein supplement	Roughage	Rate of gain
	bus.	*lbs.*		
A. Full feed of good legume or mixed hay. No other roughage	..	.	1 ton good legume or mixed hay. (If low grade hay is used, 100 lbs. of protein supplement should be added)	.7 to 1.2 lbs.
B. Full feed of a combination of good legume or mixed hay silage and supplement	..	80	⅔ ton of good hay 1 ton of grass silage	.9 to 1.4 lbs.
C. Full feed roughage plus a light feed of corn-and-cob meal and supplement	7	100	(a) ⅔ ton of good hay and 1 ton grass silage or (b) 1 ton good hay alone	1 to 1.5 lbs.

b. Yearling steers and heifers—growth rather than finishing being the objective (initial weight 600 to 675 pounds).

1. Pasture season

Approximate pasture requirement and rate of gain for yearling steers and heifers.

When pastured during the entire season (200 to 225 days) and no other feed is provided, pasture equivalent to 125 A.U. days will be needed or a little less than three-fifths as much as a mature dairy or beef animal.

Rate of gain—on average or better quality pasture, 1½ pounds per day.

2. Winter season

Approximate feed requirements and rate of gain for yearling steers and heifers during a normal Ohio winter feeding period

Types of ration used	Grain	Protein supplement	Roughage	Rate of gain
	bus.	*lbs.*		
A. Full feed, average or better hay	..	...	1⅔ tons average or better hay	.8 to 1.4 lbs.
B. Full feed, low grade roughages (poor mixed hay, timothy hay, corn stover, and straw)	..	150	1⅔ tons non-leguminous dry roughage	.6 to 1 lb
C. Full feed, a combination of good hay and silage	..	...	1 ton legume or good mixed hay 2 tons grass silage	1.0 to 1.6 lbs

c. Two-year-old steers and heifers—growth rather than finishing being the objective (initial weight 950 to 1000 pounds).

1. Pasture season

Approximate pasture requirements and rate of gain for two-year-olds:

When pastured during an entire season (200 to 225 days) and no other feed is provided, pasture equivalent to 200 A.U. days will be needed or approximately the same as a mature dairy or beef animal. Rate of gain on average or better pasture 1½ pounds per day.

III. The Fattening Enterprise

a. Finishing in dry lot (total feed requirement for a fairly satisfactory finish).

Age of feeder and type of ration fed	Approximate amount of feed required to bring to a fairly satisfactory finish				Approximate feeding period
	Corn	Protein supplement	Silage	Hay	
	bus.	*lbs.*	*tons*	*tons*	*days*
1 *Calves*—initial weight 375 to 450 lbs. Gain required for a fairly satisfactory finish, approximately 400 lbs.					
(a) When full fed—corn-and-cob meal supplement, silage, and average legume or good mixed hay	35	300	¾	¼	175 to 210
(b) When full fed—corn-and-cob meal, supplement, and average legume or good mixed hay	40	275	..	½	175 to 210
2 *Yearlings*—initial wt. 650 to 700 lbs Gain required for a fairly satisfactory finish, approximately 320 lbs.					
(a) When full fed—corn-and-cob meal, supplement, silage and average legume or good mixed hay	34	250	1	¼	140 to 175
(b) When full fed—corn-and-cob meal, supplement, and average legume or good mixed hay	40	250	..	⅔	140 to 175
(c) When fed a limited feed of corn-and-cob meal, supplement, silage, and a liberal quantity of hay	25	275	½	1	185 to 210
3 *Two-year-olds*—initial weight 950 to 1000 pounds					
(a) When full fed—corn-and-cob meal, supplement, silage, and average legume or good mixed hay	28	225	1½	¼	120 to 145
(b) When full fed—corn-and-cob meal, supplement, and average legume or good mixed hay	36	200	..	¾	120 to 145

b. Finishing on pasture with pasture alone during the first part of period and pasture plus grain supplement and hay during the latter part of the period[1]

Winter feeding—period[2]

Pasture only—period

Days in period	64
Initial weight, lbs.	689.1
Final weight, lbs.	812.5
Total gain, lbs.	123.4
Average daily gain, lbs.	1.93

(1) Source: "Acre Yields of Beef from Corn and Meadow Crop," Ohio Agricultural Experiment Station Research Bulletin 753, 1955

(2) During the four years a group of steers (average 21 per year) were purchased in the fall, wintered to gain 1. to 1.25 pounds per head daily and then used to measure the pounds of beef produced per acre from pasture. These calves were fed corn silage, mixed hay and a limited amount of soybean oil meal during the winter period.

Pasture plus grain supplement and hay—period

Days in period	83
Initial weight, lbs.	812.5
Final weight, lbs.	1000.5
Total gain, lbs.	188.0
Average daily gain, lbs.	2.26

Feed consumed in addition to pasture per 100 pound gain during period when both were supplied.

Corn and cobmeal, bus.	6.2
Soybean meal, lbs.	16.5
Mixed hay, lbs.	117.0
Average dressing percentage	57.0

IV. Average Feed Consumed and Rate of Gain on Illinois Beef Farms 1938-49[10]

a. Steer calves

Item	Drylot fed		Pasture fed		Delayed feeding	
	Without silage	With silage	Without silage	With silage	Without silage	With silage
			Steer	*calves*		
Number of droves	21	15	84	45	8	7
Average date bought	Oct. 11	Oct. 24	Oct. 21	Oct. 27	Oct. 13	Oct. 25
Average date sold	Aug. 23	Sept. 10	Sept. 27	Oct. 25	Dec. 23	Jan. 16
Total days on farm	316	320	341	363	436	451
Sale weight	960	963	989	1,024	1,046	1,018
Purchase weight	419	419	421	442	445	434
Net gain per head	541	544	568	582	601	584
Gain per head per day on farm	1.71	1.70	1.66	1.60	1.38	1.29
Feeds fed per 100 lb. gain						
Corn (bu.)	10.0	10.0	9.0	8.2	6.3	6.5
Oats and other grains (bu.)	2.2	2.2	1.8	2.1	.3	1.3
Protein and minerals (lb.)	47	54	44	52	23	41
Hay (lb.)	262	166	231	204	358	332
Silage (lb.)	...	353	...	370	. .	638
Pasture (animal unit day)	3.1	1.1	8.8	9.7	23.0	21.9

(1) Source—Account record kept under supervision of Illinois Farm Bureau Farm Management Service. Results published in "Profits and Losses from Feeding Cattle in Illinois." Department Agricultural Economics, University of Illinois, October 1952, AE 2901.

Heifer calves—"Heifer and steer calves did not differ significantly in feed requirements per unit of gain. The heifers were fed for shorter periods and made less total gain. Rates of gain were also lower."

b. Good to choice yearling steers

Item	Good-to-choice yearling steers					
	Short-fed		Long-fed			
	Drylot fed		Drylot fed		Pasture fed	
	Without silage	With silage	Without silage	With silage	Without silage	With silage
Number of droves	49	28	45	29	69	41
Average date bought	Oct. 15	Oct. 17	Oct. 14	Oct. 19	Oct. 17	Oct. 19
Average date sold	Apr. 29	May 8	July 23	Aug. 12	Aug. 27	Sept. 9
Total days on farm	196	203	282	297	314	326
Sale weight	1,015	1,025	1,088	1,092	1,084	1,095
Purchase weight	673	684	633	624	611	613
Net gain per head	342	341	455	468	473	481
Gain per head per day on farm	1.74	1.68	1.61	1.58	1.51	1.48
Feeds fed per 100 lb. gain						
Corn (bu.)	12.8	10.4	12.2	10.8	11.0	8.1
Oats and other grain (bu.)	.8	.5	1.4	1.4	1.2	1.5
Protein and minerals (lb.)	49	55	54	67	44	47
Hay (lb.)	309	243	336	228	291	268
Silage	...	774	...	652	.	617
Pasture (animal unit days)	9.8	7.0	6.7	4.6	16.1	14.8

(1) Source—Account records kept under supervision of Illinois Farm Bureau Farm Management Service. Results published in "Profits and Losses from Feeding Cattle in Illinois." Department Agricultural Economics, University of Illinois, October 1952, AE 2901.

Part V—The Sheep Enterprise

Contents

The predominant type of sheep enterprise to be found in Ohio is the breeding flock for both wool and lamb production. The other type of sheep enterprise is the production of fat lambs. Some men combine both, and frequently the lambs produced by the farm flock are fattened.

The feed requirement for both the breeding flock and feeder lambs varies, not only with the ration and method of feeding followed, but with the health of the sheep. Disease and parasites materially influence this enterprise and heavy death loss or slow gains increase the quantity of feed required for a given weight of lambs or quantity of wool marketed.

The average farm flock of ewes receives most of its feed in the form of pasture and roughage. As these two types of feed vary greatly in quality, it is difficult to establish feed requirements that apply equally well in all cases. Consequently, actual farm experience, when available, provides the best guide.

Feed requirement data are provided for the breeding flock, replacement animals, and feeder lambs. The requirements for breeding and replacement animals are further divided into medium and fine wool flocks.

A. Generalized feed requirements

I. Breeding Flock

(a) Medium wool flocks.—The approximate amount of feed required annually per ewe, including the lamb until weaning time, is 550 to 650 pounds of dry roughage, predominately average legume or good mixed hay (the amount depending on the quality of roughage and on the length of the winter feeding period), 90 to 110 pounds of mixed grains, and pasture equivalent to 40 to 45 a.u. days of pasture.

(b) Fine wool flocks.—The approximate amount of feed required annually per ewe, including the lamb until weaning time, is 400 to 450 pounds of dry roughage, predominately average legume or good mixed hay (the amount depending on the quality of the roughage and the length of the winter feeding period), 60 to 80 pounds of mixed grains and pasture equivalent to 30 to 35 a.u. days of pasture.

II. Replacement Stock

(a) Medium wool replacements.—The approximate requirement per ewe lamb from weaning until it enters the breeding flock as a yearling ewe is: Pasture equivalent to 10 a.u. days for the first summer and fall after weaning; 450 pounds of average legume or good mixed hay for the winter period; and pasture equivalent to 40 a.u. days during the second summer.

(b) Fine wool replacements.—The approximate requirement per ewe lamb from wearning until she enters the breeding flock as a yearling ewe is: Pasture equivalent to 7 a.u. days for the first summer and fall after weaning, 350 pounds of average legume or good mixed hay for the winter feeding period, and pasture equivalent to 30 a.u. days during the second summer.

(c) Purchased yearling ewe replacements.—The requirements are approximately the same as that of mature medium wool ewes (See I(a) above).

III. Fattening Lambs

To produce a fairly satisfactory finish, a gain of 25 to 30 pounds per head is required on lambs weighing 60 to 70 pounds at the beginning of the feeding period. To do this, the approximate quantities of feed and length of feeding period required per lamb for different rations are as follows:

Type of ration fed	Grain	Protein Supplement	Silage	Hay	Length of feeding period
	lbs.	*lbs.*	*lbs.*	*lbs.*	*Days*
Shelled corn and good legume hay	115	..	...	160 to 200	90 to 100
Shelled corn, supplement, and good legume hay	100	10	...	140 to 180	80 to 90
Shelled corn, silage, and good legume hay	100	..	100	100 to 140	90 to 100
Shelled corn, supplement, silage, and good legume hay	90	10	100	100 to 140	80 to 90
Shelled corn, average legume or mixed hay, and corn stover or other low grade dry roughage	125	..	...	175 to 225	100 to 120

Have You Read:

Commercial Cattle Feeding in Ohio—Extension Bulletin 355

Commercial Beef Cow Herds in Ohio—Extension Bulletin 332

Sheep Raising in Ohio—Extension Bulletin SB-9

Growing and Fattening Hogs—Extension Bulletin L-45

Baby Pigs—Swine Management—Extension Bulletin L-48

Marketing—Swine Management—Extension Bulletin L-51

Feeding—Swine Management—Extension Bulletin 363

These and other Extension bulletins are available through the office of your County Agent.